



HUBERT H. HUMPHREY, III  
ATTORNEY GENERAL

**STATE OF MINNESOTA**  
OFFICE OF THE ATTORNEY GENERAL

**ST. PAUL 55155**

September 9, 1983



ADDRESS REPLY TO:  
ATTORNEY GENERAL'S OFFICE  
POLLUTION CONTROL DIVISION  
1935 WEST COUNTY ROAD B-2  
ROSEVILLE, MN 55113  
TELEPHONE: (612) 296-7342

Robert Leininger  
Enforcement  
EPA - Region V  
(EWPE)  
230 S. Dearborn  
Chicago, Illinois 60604

Re: U.S. v. Reilly Tar & Chemical Corp.  
File No. Civ. 4-80-469

Dear Bob:

As you requested, I am enclosing a copy of the errata list  
for the ERT report.

Very truly yours,

STEPHEN SHAKMAN  
Special Assistant  
Attorney General

SS:mah

Enclosure

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EPA - REGION V

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July 8, 1983

Mr. Stephen Shakman, Esq.  
Minnesota Pollution Control Agency  
1935 West County Road B2  
Roseville, Minnesota 55113

RECEIVED  
JUL 11 1983  
EPCOA  
ATTORNEY GENERAL

Dear Mr. Shakman:

Enclosed is a copy of the errata list and attachments for the April 1983 ERT report - Recommended Plan for a Comprehensive Solution of the Polynuclear Aromatic Hydrocarbon Contamination Problem in the St. Louis Park Area.

Sincerely,

*Mark R. Kaster*

Mark R. Kaster  
Legal Assistant

MRK:vlp

cc: Mr. Edward J. Schwartzbauer, Esq.

Enclosures

**Errata for ERT's April 1983 Report  
"Recommended Plan for a Comprehensive Solution of the  
Polynuclear Aromatic Hydrocarbon Contamination Problem in the  
St. Louis Park Area"**

**Environmental Research & Technology, Inc.  
Concord, MA 01742  
Pittsburgh, PA 15219**

**June 27, 1983**

**The attached tables list corrections for errors in the report referenced above. Corrections are only given for substantive technical errors and not for minor typographical or grammatical errors.**

**The corrections are grouped separately for each Appendix and for the Technical Report (Volume I). In some instances, reprinted copies of figures and tables are attached. No substantive corrections are required for Appendices A, D, F, and L.**

## Volume I Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
21a	First item	-	4-23-73 Study is listed twice.
21a	Fourth item	-	The date of this study is "9-0-74".
21a	Fifth item	-	Delete "Report on Investigation of Municipal Water Supply, St. Louis Park."
39a	-	-	A footnote should be added to the first sentence in the definition of "Polynuclear Aromatic Hydrocarbons (PAH)" that reads as follows: "In certain instances, chemicals with two or more aromatic rings that are linked by an aliphatic bond (e.g., biphenyl, phenylnaphthalene) have been treated in this report as PAH compounds, although this does not strictly follow this definition."
62a	2	9	Should read "from 100 to 400".
70a	3	2	Should read "\$0.9 million to \$2.4 million".
21	-	-	Same corrections as indicated for page 21a.
36	4	4	Should read "such as vegetable gardening".
41	3	13	Should read "(see Chapter 6 for details)".

Volume I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
52	Table 4-1	-	Seventh compound in list of carcinogenic unsubstituted heterocyclic PAH should be "7H-Benzo(g)- $\gamma$ -carboline."
53	Table 4-2	-	Delete benzo(a)pyrene and fluoranthene. In sentence below the title, change second line to read "... isomers of the three- and four-ring compounds ...".
57	2	7	Reference should be "U.S. EPA 1980a".
59	4	3	Should read "... is from 240 to 740 micrograms ...".
60	1	5	Should read "... 370 micrograms per liter ...".
61	Table 4-4	-	Delete benzo(g)chrysene from the list of noncarcinogenic unsubstituted PAH, as this compound is carcinogenic (see Table 4-1). Delete benzo(a)tetracene (synonymous with benzo(a)naphthacene), dibenzo(a,g)phenanthrene (synonymous with benzo(c)chrysene) and tetracene (synonymous with naphthacene). Add note (c) to benzoquinoline that reads "(c) Isomer not specified."
74	Figure 4-2	-	In noncarcinogens histogram for SLP4, the value for August 1980 should be 0.0015 micrograms per liter.

Volume I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
79	Figure 4-7	-	Line drawn for the lower bound proposed noncarcinogenic PAH criterion of 4 parts per billion should be lowered somewhat. Contrary to what appears in Figure 4-7 with this line as drawn, the analyses of July 1979, June 1980 and August 1981 all slightly exceeded 4 parts per billion (by from 0.3 to 0.6 parts per billion, see Appendix K).
80	Figure 4-8	-	Values of zero for both carcinogenic and noncarcinogenic PAH should be added for October 1981.
100	Table 5-3		Present value costs in \$ million for "Excavation" should be ">200", for "Ground Fluid Recovery" should be "0.085", for "Bioreclamation" should be "0.68-3.56" and for "Monitoring" should be "0.24-0.65". Add note (a) to "Monitoring" that reads "(a) Monitoring costs include some additional site use control items that are costed separately in Chapter 6 and 7 (see Appendix C, Table C6-1).".
143	3	4 & 5	Should read "via multi-aquifer well flow from".
151	1	7	Should read "aquifer, one well draws".
	1	9	Should read "draws" not "drawing".

Volume I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
152	Figure 6-2	-	Well. SLP6 is not closed and should not be underlined or crossed out.
155	Table 6-2	-	Pumpage of 573.9 million gallons in 1976 is for Hopkins wells H4 and H5 together.
156	Figure 6-3	-	Hopkins well H1 does have iron removal treatment.
158	Table 6-3	-	Total for the year 2000 should be 255,500 - 256,500. Note (e) should add ", 1990 data used."
161	Table 6-5	-	For SLP7 and SLP9, change "Not Predicted" to "Never".
168	Table 6-6	-	For the Hickok PAC tests, carcinogenic PAH in untreated water should be 50, not 60, nanograms per liter and noncarcinogenic PAH in treated water should be 1, not 2, nanograms per liter. For the CH2M Hill tests, the ozone bench-scale testing should be described as "1 milligram per liter dose and 20 minutes residence time."
174	Table 6-7	-	For the case of wells without existing iron removal plants with ozone or PAC injection, the operating and maintenance costs should be increased by \$6 thousand, which increases the present value costs

Volume I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>									
			by \$120 thousand (see Appendix G, page G-240 correction). The correct cost figures are as follows (in \$ thousands):									
			<table><tr><th><u>Case</u></th><th><u>Operating and Maintenance Cost</u></th><th><u>Present Value Cost</u></th></tr><tr><td>ozone injection</td><td>33-35</td><td>1310-1420</td></tr><tr><td>PAC injection</td><td>28-42</td><td>1090-1370</td></tr></table>	<u>Case</u>	<u>Operating and Maintenance Cost</u>	<u>Present Value Cost</u>	ozone injection	33-35	1310-1420	PAC injection	28-42	1090-1370
<u>Case</u>	<u>Operating and Maintenance Cost</u>	<u>Present Value Cost</u>										
ozone injection	33-35	1310-1420										
PAC injection	28-42	1090-1370										
178	2	16	Should read "existing iron".									
179	1	18	Should read "... cost of from \$120,000 to \$220,000 ...".									
183	Table 6-10	-	Entry for Edina in 2063 for the best case prediction should be 580 million gallons per year.									
184	3	9	Should read "... based on 300 to 500 ...".									
188	3	4	Should read "and vegetable gardening".									
193	Table 6-12	-	Present value cost estimate for municipal supply well monitoring under worst case migration for a noncarcinogen criterion of 4 micrograms per liter using new Mt. Simon-Hinckley wells should be \$0.38-0.51 million, not \$0.40-0.51 million. This changes the corresponding total to \$0.86-\$1.18 million.  Footnote (d) should read "... reporting for municipal supply wells and for Drift-Platteville and St. Peter monitoring wells.".									
196	3	11	Should read "... to \$600,000 for an ozone dose ...".									
210	3	3	Should read "many relatively shallow".									


Volume I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
218	1	12	Should read "water supply, vegetable gardening,".
	2	5	Should read "water supply, vegetable gardening,".
223	3	9	Should read "would not be cost-effective relative to use restrictions."
224	1	7	Should read "... from \$7.0 to \$1.6 million ...".
226	3	8 & 9	Should read "... (300 to 400 million gallons per year) ...".
227	1	2	Add a final phrase that reads ", including the cost of incremental pumpage from a new Mt. Simon-Hinckley well that has already been drilled in St. Louis Park (well SLP17)."
231	Table 7-1 (Cont'd)		Switch the "Total Estimated Present Value Cost" for the last two bullet items on the page. The cost of a 4 microgram per liter noncarcinogen criterion with drinking water treatment is \$1.9-4.5 million and the cost of the same criterion with new Mt. Simon-Hinckley wells is \$2.0-4.7 million.

Volume I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
232	Table 7-2	-	The description for recommendation C3 should read "... in the Drift/Platteville and remove ...".
239	3	2	Should read "... analysis data (Task 2C)."
240	Table 7-3	-	Cost of \$900,000 is for Tasks 1d-1g and cost of \$250,000 is for Task 2d and 2e.
241	Table 7-3	-	Comment opposite Tasks 4b and 4c applies to Tasks 4b to 4d.

## Appendix B Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
B-48	Figure B5-8	-	Source should read "Erhlich et al. 1982, Hult and Schoenberg 1981"; Numbers on potentiometric surface contours should be 889 and 879.
B-51	Figure B5-10	-	Note 3 should read "Wells W27 and W33 were open to the Platteville and St. Peter prior to 1979"; the symbol for W27 should be  indicating that it is now only open to the Platteville.
B-56	Table B5-2	-	References to Hult 1981 refer to Hult and Schoenberg 1981, Erhlich 1982 refers to Erhlich et al. 1982; units are micrograms per liter.

### Appendix C Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
C-14	Table C2-1 (Cont'd)		Add a seventh bullet item under "Disadvantages" to Surface Sealing: "o not effective in limiting origination of contamination present in saturated soil."
C-15	Table C2-1 (Cont'd)		Delete the word "derivatives" from fourth bullet item under "Disadvantages" to In-situ Treatment.
C-17	Table C2-2	-	Put an asterisk in third column ("This Appendix") for "Well Closures" and "Additional Municipal Water Treatment," and add at bottom of table: "* Discussed in Chapter 6."
C-34	Table C3-4	-	Add less-than signs for values in 6/2/77 column for Cadmium, Copper and Lead.
C-52	3	11	(last bullet item of page) change "monitored quarterly" to "monitored semi-annually."
C-54	Table C4-1	-	Sewer Hookup capital costs should be "30,000", total cost should be "175,000".
C-66	Table C5-2 (Cont'd)		For "Nutrients" the "Capital" column should be blank, the "Annual Operation and Maintenance" column should be "6,000", and the "Time" column should be "5".

Appendix C (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
C-79	4	10	Should read "... 60 monitoring points for a period of 20 years to 100 years at an annual to semiannual sampling frequency."
C-80	Table C7-1	-	Bioreclamation cost should be \$680,000 to \$3,560,000 and Monitoring/Site Use Controls cost should be \$240,000 to \$650,000.

## Appendix E Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
E-33	3	566	Should read "directions and speeds predicted by the model will agree adequately with observed behavior."
E-33	5	2	Should read "north of the site caused by".
E-39	1	9	(definition of ) should read "aquifer at radius $r$ (L)".
E-65	Figure E3-8	-	On the Plant Site, W29 should be W23; At SLP7, 61 should be 62; SLP15 and SLP10 should be reversed; At E2, 36 should be 9; At E6, 1 should be 2; At E13, 5 should be 6; W53 should be W63. Corrected version is attached.
E-67	Figure E3-9	-	At SLP7 and SLP9, 70 and 97 should be reversed; At SLP10 and SLP15, 4166 and 3483 should be reversed; At H4, 7 should be 16; At H5, 16 should be 7; W88 should be W66; At the Plant Site, W29 should be W23; W53 should be W63. Corrected version is attached.
E-68	Table E3-1	-	For SLP7, 87 should be 97, under 1980-1981 data, Average.
E-81	1	24	Should read "pumping center remains active."

## Appendix G Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
Table of Contents		-	There is no section G5-6.
G-4	Figure G2-1	-	Well SLP6 is not closed and should not be underlined.
G-29	Figure G2-10	-	Hopkins well H1 does have iron removal treatment.
G-30	2	6	Should read "from 2.3 to 3.0 gallons per minute . . ."
G-31	Table G2-5	-	The well capacity figures given for the Hopkins wells are actually 1976 production figures. Well capacity figures for Hopkins wells in gallons per minute are 900 for H1, 1250 for H3, and 2800 for H4, H5 and H6 combined.
G-32	Table G2-6	-	The design filtration rate for Hopkins plant H3 is 3.0 gallons per minute per square foot, not 2.1 gpm/ft <sup>2</sup> .
G-42	Table G3-1	-	Footnote (a) applies to the first two rows of the table and the reference to footnote (b) in these two rows should be deleted. In footnote (c), "benzo(h)fluoranthene" should read "benzo(k)fluoranthene".
G-46	Table G3-2	-	Footnote to the New York, NY entry should be (e), not (c).

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-41 to G-52	-	-	It should be noted that benzo(k)-fluoranthene is discussed in section G3 as if it is carcinogenic, even though Appendix I Table I2-1 indicates that it is not. This was done because of uncertainties in nomenclature used in the quoted literature for benzofluoranthenes. Compare, for example, Table I of Sorrell, et al, 1980 with Appendix K Table K3-1.
G-48	2	10	The following text is missing at the end of this paragraph: "... Russian investigators show that the chlorine derivatives of benzo(a)pyrene are noncarcinogenic. Similarly, Harrison, et al (1975) note that chlorinated PAH and quinone-type derivatives have been shown to be noncarcinogenic."
G-76	Table G4-7	-	In footnote(d), "stet" should be "sand".
G-79	2	4	Should be "26 PAH compounds".
G-80	Table G4-8	-	Delete "1H-Indene", which is the same as "Indene".
G-83	Table G4-9	-	Delete "X" for methyldibenzofurans in the CH <sub>2</sub> M Hill column. Delete line for 1H-indene (synonymous with indene).
G-110	-	-	Footnote should be located on previous page (G-109).

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-116	2	2	Should read "... from 75 to 79 percent..."
G-116	2	6	Should read "... with 11 nanograms per liter of carcinogenic PAH."
G-118	4	7	Insert the following sentence between the words "steps" and "some": "This was done at the suggestion of the MPCA."
G-130	2	14	Reference should be "Tollefsrud (1982b)."
G-132	1	6	Should read "... sample handling procedures are given in MRC 1982a."
G-134	3	15	Reference should be "MRC 1982a".
G-136	1	5	Reference should be "MRC (1982a,b,c)."
G-150	Table G4-26	-	For sample 4A-6, laboratory analysis results for iron and manganese should be 0.049 and 0.089 milligrams per liter, respectively (see Table G8-2C).
G-173	Table G4-29	-	Filter outlet concentrations should read as follows: 2-ring PAH - $1850 \pm 340$ , 3-ring and 4-ring PAH - no change, total PAH and noncarcinogenic PAH - $5150 \pm 590$ . Ratios of filter outlet to wellhead concentrations should read as follows: 2-ring PAH - $1.08 \pm 0.26$ , 3-ring and 4-ring PAH - no change, total PAH - $0.96 \pm 0.16$ , noncarcinogenic PAH - $0.97 \pm 0.16$ .

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-174	2	15	All three of the sample numbers in parentheses should end in "S", not in "5".
G-178	Table G4-30	-	For sample 3B-1, the 3-ring PAH concentration should be 4,050 nanograms per liter, the total PAH concentration should be 7,880 nanograms per liter, and the noncarcinogenic PAH concentration should be 7,810 nanograms per liter. For sample 2-1, the total PAH and noncarcinogenic PAH concentrations should be 7,690 and 7,630 nanograms per liter, respectively.
G-179	2	7	Reference should be "CH2M Hill 1982e".
G-181	2	3	Delete the words "three and".
G-183	2	9	Should read "... and about 6 percent removal ..."
G-184	Table G4-32	-	Method blank results should read as follows for 2-ring, 3-ring, 4-ring and total PAH: unfiltered - no change; filtrate - 66, 57, 19 and 142; residue - 17, 29, 18 and 64.
G-185	Table G4-33	-	Average ratios for method blank residue to unfiltered should read as follows: 2-ring PAH - no change, 3-ring PAH - $0.011 \pm 0.002$ , 4-ring PAH - $0.033 \pm 0.005$ , total PAH - $0.013 \pm 0.001$ .

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-193	2	8	Should read "... were about 40 percent higher ...."
G-194	Table G4-36	-	MRC results for filter outlet standard conditions should read: 2-ring PAH - $1490 \pm 340$ , 3-ring, 4-ring and carcinogenic PAH - no change, total and noncarcinogenic PAH - $4790 \pm 590$ . Ratios of CH2M Hill to MRC results should read: 2-ring PAH - $1.43 \pm 0.32$ , 3-ring and 4-ring PAH - no change, total PAH - $1.42 \pm 0.25$ . In footnote (g), "rations" should read "ratios".
G-197	1	3	Should read "... by about 40 percent...".
G-203	3	4	Sentence should read: "The only difference in analytical procedures was that 60 to 80 gram sand samples were extracted with methylene chloride in a soxhlet extractor compared to 5 gram samples being extracted by ultrasonication with benzene, as was done for sand samples from the December 1982 test."
G-217	2	16	Should read "... every nanogram per liter of PAH..."

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-222	Table G4-47	-	<p>For the Hickok PAC tests, the carcinogenic PAH in untreated water should be 50, not 60, nanograms per liter and the noncarcinogenic PAH in the treated water should be 1, not 2, nanograms per liter.</p> <p>For the CH2M Hill tests, the ozone bench-scale testing should be described as "1 milligrams per liter dose and 20 minutes residence time."</p>
G-223	Notes to Table G4-47		<p>Second line of note (b) should read "... wells SLP11 and SLP15 ...". Note (i) should be labeled note (j). Original note (i) is missing and should read: "(i) Results of wellhead and filter outlet samples from Table G4-10."</p>
G-240	Figure G5-2	-	<p>Abscissa and parametric lines are mislabeled. Corrected version is attached.</p>
G-245	Table G5-6	-	<p>Costs are in \$/year, not \$ thousands/year.</p>
G-249	Table G5-7	-	<p>Capital costs for 5 milligrams per liter dose for a 5000 gallon per minute plant should read "136 (17)" and for 10 milligrams per liter dose for a 3000 gallon per minute plant should read "139 (16)".</p>
G-251	Table G5-8	-	<p>Costs are in \$/year, not \$ thousands/year.</p>

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-259	2	13	Should read "... time of 6 years..."
		16	Should read "... capacity of 0.33 pounds..."
G-260	Figure G5-8		Units for GAC column size should be "Pounds of Carbon".
G-277	Figure G5-12	-	Cost curves are drawn incorrectly. Corrected version is attached.
G-284	3	4	Should read "... account for \$0.8 million of this cost".
G-284	Footnote	10 & 11	Should read "... cost of \$840,000 at a flow rate of 100 million gallons per year and \$1,080,000 at a flow rate of 300 million gallons per year ...".
G-284	Footnote	14 & 15	Should read "... is from \$120,000 to \$220,000 at 100 million gallons per year and \$370,000 to \$670,000 at 300 million gallons per year ...".
G-285	Table G5-13	-	In "Iron Removal Plant" column the present value costs for SLP4 and E3 should be \$670 thousand and \$430 thousand, respectively, and a total of \$760-820 thousand should be added. The total present value costs should be \$1650-2550 thousand for PAC injection and \$2740-3220 thousand for ozone injection.
G-286	2	12	Should read "... and by at least \$1.6 million ...".

Appendix G (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
G-287	Table G5-14	-	In far right-hand column, figure for well E3 should be 30 million gallons per year, with a total of 1250 million gallons per year.
G-290	Table G5-16	-	Note (d) should read "... cost of \$4,300 per year ...", so that the cost throughout row 6 ("Additional Iron Removal Plant Operating Costs at SLP6") should be \$85 thousand. In addition, the costs in rows 1 and 3 for the PAC and ozone injection columns are high by \$20 thousand (see correction to Table G5-13 above). These changes and their effects on other rows are corrected in the attached version of Table G5-16.
G-291	1	2 & 3	Should read "... range from \$0.5 million to \$0.8 million ...".
G-311	Table G8-1E	-	Concentration of dihydroacenaphthylene for sample 3B-1-P should be 1700 nanograms per liter, not 170 nanograms per liter.
G-385	Figure G8-7	-	Title should read "... Well SLP3 Flowrate ..."

Appendix H

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
H-1	1	16	Should read "... thus the estimates of PAH ..."
H-3	1	11	Should read "... of piezometers P14 and P119, ..."
H-6	5	1	Should read "... example of 10 to 400 micrograms ..."
H-13	3	5	Should read "... to range from 240 to 740 micrograms per day."
H-19	-	-	Same footnote should also be at bottom of page H-17.
H-19	2	5	Should read "... acceptable daily intake of noncarcinogenic PAH ..."
H-26	Table H7-1	-	Food Processing/Middle Drift value should be 760-43,000 micrograms per day and Acceptable Daily Intake of Noncarcinogenic PAH should be 240-740 micrograms per day.

## Appendix I Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
I-3	3	5	Revise to add the following sentences : "... carcinogenic activity. Table I2-2 lists alkylated PAH containing three or four rings that have been tested for carcinogenicity. Alkylated PAH with five or more rings are not included because their parent structures have not been detected in St. Louis Park municipal supply wells. Numerous heterocyclic derivatives ..."
I-4	Table I2-1	-	Benzo(g)chrysene is listed twice as both "+" and "-"; it should be listed once and rated as "+".
I-6	Table I2-2	-	Title should be changed to read "Carcinogenic Activity of Some Substituted Polycyclic Aromatic Hydrocarbons Having Three or Four Condensed Rings".
I-8	Table I2-2	-	3-Methylcholanthrene should be rated "+". Should add 2-methylpyrene as "-" at the end of Table I2-2.
I-9	1	3	Should read "... their alkylated derivatives ...".
I-9	1	16	Should read "The lists of compounds in ...".

Appendix I (Cont'd

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
I-10	Table I2-3	-	Benzoquinoline should have note (c) added that reads "(c) Isomer not specified."
I-12	3	7	Date for Horton, et al. reference should be 1963.
I-21	1	11	Should read "... see page I-46 of this appendix ..."
I-21	2	7 & 8	Should read "... or 74.2 milligrams per day ..."
I-23	Table I3-2	-	In second column of data, experimental dose should be 0.1 mg (not 0.4 mg) and the corresponding transformed dose should be 0.35 mg/kg/day (not 1.4 mg/kg/day). In the third column of data (0.05 mg experimental dose), the transformed dose should 0.18 mg/kg/day (not 0.02 mg/kg/day).
I-25	1	10	Should read "... a criterion limit of 200 micrograms ..."
I-25	1	11	There should be a parenthetical phrase after "... exceed the ADI" that reads "(allowing for an estimated dietary intake of 16 micrograms per day)."

Appendix I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
I-29	Table I4-1	-	Footnote (b) should read: "See Table I4-2 for ..." Fourth column should be headed "Oxygenated-PAH <sup>(c)</sup> ", not "Activity Unknown <sup>(a)</sup> " and footnote (c) should be added reading "(c) Oxygenated PAH analyzed by Benoit, et al. (1979) were acenaphthenequinone, anthraquinone, 9-fluorenone and perinaphthenone and by Williams, et al. (1982) were anthraquinone and fluorenone.
I-31 & 32	Table I4-2	-	<p>The column headed "MRC" should also have X's shown for acridine, carbazole, 2,3-dihydroindene, indene, and dimethylnaphthalenes. The column headed "Williams" should also have X's shown for fluorene, biphenyl, and bibenzyl. The third to last compound on the page I-32 should be "dimethylbiphenyl".</p> <p>Add note (c) to CH2M Hill heading that reads as follows: "(c) In addition to the compounds listed, CH2M Hill has also analyzed for aminobiphenyl, aminonaphthalene, aniline and dibenzofuran". Also add note (d) to MRC heading that reads as follows: "(d) In addition to the compounds listed, MRC has also analyzed for dibenzofuran, dibenzothiophene, methylacenaphthenes, methyldibenzofurans, methylphenanthrenes, and phenylnaphthalene".</p>

Appendix I (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
I-47	1	4	Should read "In the case of noncarcinogenic PAH, ..."
I-47	1	5	Should read "... in the range of 1 to 13 ..."
I-51 & 52	-	-	The reference listed for Lewis (1975) on page I-51 is out of order and should be listed on page I-52.
I-54	-	-	Reference for Symons (1975) needs to be added as follows "Symons, J.M., et al. 1975. <u>J. Amer. Water Works Assoc.</u> 67:634ff."

## Appendix J Errata

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
J-1	2	8	Should read "... whether or not they are identified...".
J-3	1	3	Should read "Carcinogenic PAH and carcinogenic heterocyclic PAH".
		4	Should read "Noncarcinogenic PAH and noncarcinogenic heterocyclic PAH".
J-8	Table J3-1	-	Group 3 definition should read "... but which may become contaminated within the next 100 years."
J-39	2	5	Should read "... (400 micrograms per liter) ..."
J-40	Table J8-2	-	Footnote (d) should read "... currently exceed 40 micrograms per liter ..." Delete SLP6 from category 2B for both of the cases with a 4 microgram per liter noncarcinogen criterion.
J-42	Table J8-3	-	Because of change in Table J8-2 described above, plus one typographical error, the following changes are required for the 4 microgram per liter noncarcinogen criterion cases, where the changes are given as correct values for the total number of wells requiring monitoring quarterly/annually/every 5 years:

Appendix J (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
J-42	(Cont'd).		<p>1) drinking water treatment case:</p> <p>a) best case migration, 1993-ca.2033 should be 4/15/9, not 4/16/9;</p> <p>b) worst case migration, 1983-2003 should be 4/15/9, not 4/16/9;</p> <p>2) new Mt. Simon-Hinckley wells case:</p> <p>a) best case migration, 1993-ca.2033 should be 0/19/9, not 0/20/9;</p> <p>b) best case migration, ca.2033-2083 should be 0/21/10, not 0/22/10;</p> <p>c) worst case migration; 1983-2003 should be 0/19/9, not 0/20/9;</p> <p>d) worst case migration, 2003-ca.2033 should be 0/20/10, not 0/21/19; and</p> <p>e) worst case migration, ca.2033-2083 should be 0/21/10, not 0/22/10.</p>
J-44	Table J8-4		<p>Heading for first row should read "400 micrograms ...". The changes described in Table J8-3 above change some of the cost figures shown in Table J8-4, but the changes are negligible (\$10,000 at most, when rounded to the nearest \$10,000) and are therefore not listed here. The one exception is that the lower bound of the worst case migration, new Mt. Simon-Hinckley estimate is reduced by \$20,000 to \$380,000.</p>

## Appendix K

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
K-4	4	5	Should read "... was used by MDH and Serco. Early USGS analyses (USGS 79) were done by the MDH using HPLC. Later USGS analyses (USGS 81) were done by both HPLC and GCMS, but only results from HPLC work are included in the data base. CH2M Hill's report also presented results by the U.S. EPA using HPLC. CH2M Hill's reporting of these results were used in this data base since EPA's original reports were unavailable to ERT, and are identified with report ID "CH2M Hill" and lab ID "EPA". Midwest Research Institute ..."
K-5	2	10	Should read "... compounds listed in Table K2-1."
K-6	1	4	The following should be added to the end of this paragraph: "Analyses by USGS 79 and USGS 81 were excluded due to uncertain sampling dates. Analyses by MRI were excluded due to inconsistencies between GCMS and HPLC results. For months with multiple samples and analyses, the average of all results for that month were used to generate Figures 4-2 to 4-8."

Appendix K (Cont'd)

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Comment</u>
K-60	Table K5-1	-	Title of table should read "Compounds Included in the Ground-Water Data Base Analyzed by Principal Laboratories(a)", with footnote (a) reading "(a) CH2M Hill and MRC analyzed for a few heterocyclic, heterosubstituted or alkylated compounds not shown in this list (see Appendix G)". Also, X's should be entered in the MRC column for acridine, carbazole, 2,3-dihydroindene and indene with a note (b) applying to each of these four entries, where footnote (b) reads "(b) Analyzed by MRC during December 1982 and February 1983 tests at St. Louis Park water treatment station number 1."
K-65 & K-88	Table K5-3	-	Report ID "EPA WHI" should be "USGS 81".
K-76 & K-90	Table K5-3	-	Report ID "EPA WHI" should be "USGS 81" and sample date should be "810000".
K-106	Table K5-9	-	Report ID for the fourth report should be "USGS 81", not "EPA WHI".

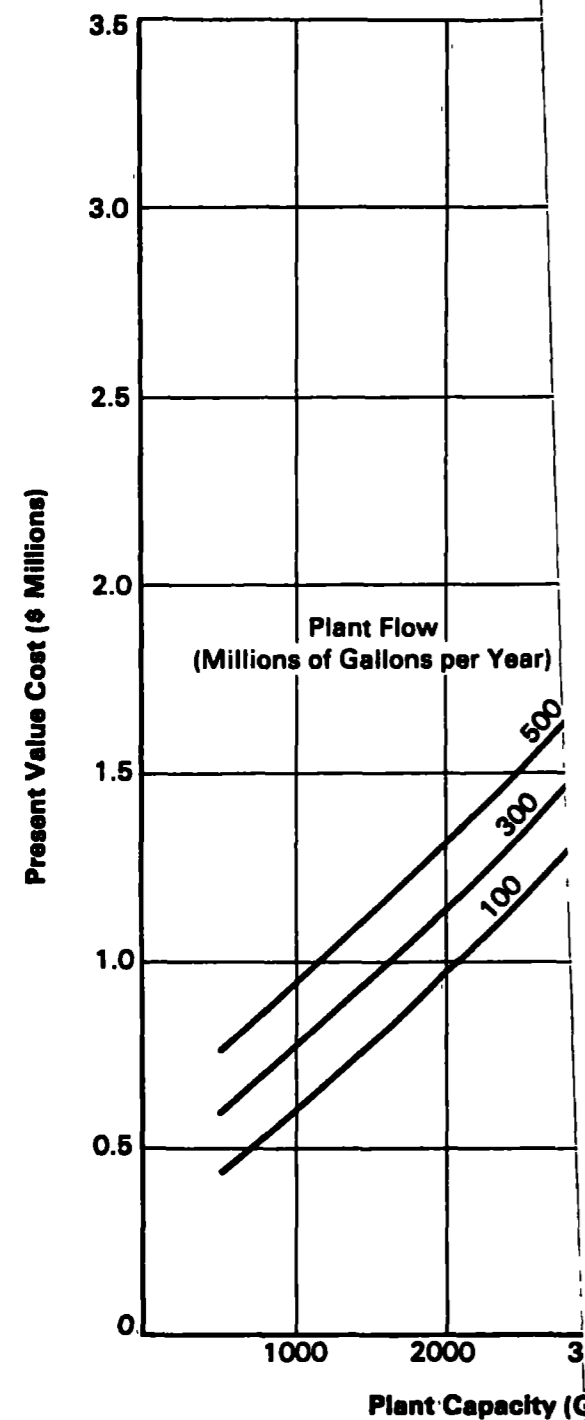
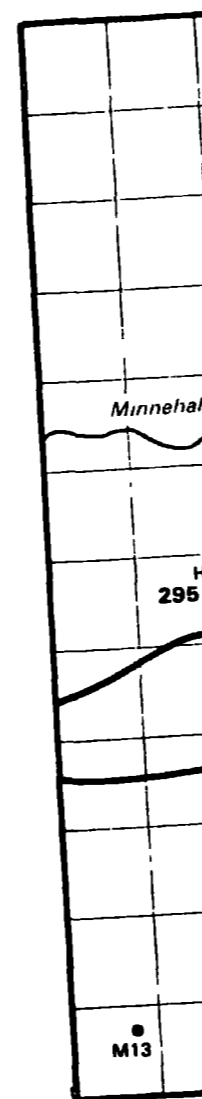


Figure G5-12 Present Value Cost of Plants (Based on annual effective performance PAH m

Operating and Maintenance Cost



EXPLANATION  
Concentration in nanograms per liter  
Data from

Figure E

Errata for ERT's April 1983 Report  
"Recommended Plan for a Comprehensive Solution  
of the Polynuclear Aromatic Hydrocarbon Contam-  
ination in the St. Louis Park Area."

June 27, 1983

Revised table and figure attachments  
to the ERT report.

Environmental Research & Technology, Inc.  
Concord, MA 61742  
Pittsburgh, PA 15219



TABLE G5-16  
POTENTIAL COST SAVINGS IN COMBINED  
TREATMENT OF WELLS SLP4 and SLP6

<u>Item</u>	<u>Present Value Costs, \$ Thousands<sup>(f)</sup></u>			
	<u>PAC Injection</u>	<u>Ozone Injection</u>	<u>GAC with Equilibrium Breakthrough</u>	<u>GAC with One-Year Breakthrough</u>
SLP 4 Treatment	845-950 <sup>(a)</sup>	1,105-1,185 <sup>(a)</sup>	860-1,560 <sup>(b)</sup>	1,280-3,300 <sup>(b)</sup>
SLP 6 Treatment	<u>230-505</u>	<u>455-555</u>	<u>980-1,590</u>	<u>1,270-3,300</u>
TOTALS	1,080-1,460	1,560-1,740	1,840-3,150	2,350-6,600
Combined Treatment of SLP4 and SLP6	255-610	545-695	1,360-2,580	2,040-5,560
Cost to Connect SLP4 to SLP6 <sup>(c)</sup>	155-225	155-225	155-225	155-225
Additional Iron Removal Plant Operating Costs at SLP6 <sup>(d)</sup>	<u>85</u>	<u>85</u>	<u>85</u>	<u>85</u>
TOTALS	500-920	780-1,000	1,600-2,890	2,280-5,870
Potential Savings, Best Case	580-540	780-740	240-260	70-730
Potential Equipment Modification Costs at SLP6 Iron Plant <sup>(e)</sup>	<u>400</u>	<u>400</u>	<u>400</u>	<u>400</u>
Potential Savings (Loss), Worst Case	180-140	380-340	(160)-(140)	(330)-330

Notes:

- (a) Includes present value cost of building an iron removal plant at SLP4.
- (b) Includes present value cost of operating GAC plant in part as an iron removal plant at SLP4.
- (c) Based on 5,200 feet of 10 inch pipe buried 4 to 6 feet deep at an installed cost (December 1982 basis) of \$20 per foot (Sanks 1980), plus 10 to 12 road crossings at \$5,000 to \$10,000 each for repaving. Assumes that no additional pumping equipment is required.
- (d) Based on additional operating and maintenance cost of \$4,300 per year for increase of 100 million gallons per year (Figure G5-2). Assumes that no equipment modifications are required in increasing the capacity of the iron removal plant at SLP6 from 1,200 to 2,400 gallons per minute.
- (e) Based on capital costs for 1,200 and 2,400 gallon per minute plants shown in Figure G5-1.
- (f) From Figures G4-12 through G4-16. Ranges reflect different design bases (injection rates or contact times).

SEP 12 1993  
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